



CENTER FOR  
IMMERSIVE AND  
SIMULATION-BASED  
LEARNING

STANFORD SCHOOL OF MEDICINE



2010-2011 Accomplishments Report

## From the Associate Dean for Immersive and Simulation-based Learning (ISL):

The academic year 2010-2011 continued the theme of major transitions for CISL. First, administratively CISL moved from being within Information Resources and Technology (IRT) to being a part of Educational Programs and Services under Senior Associate Dean Charles Prober, MD. For users this change should be transparent. It does represent recognition of the importance of immersive and simulation-based instructional techniques for the various teaching missions of the School of Medicine (medical students, graduate students, housestaff, fellows, and experienced clinicians). We have also continued the development of systems, activities, and services in the Goodman Immersive Learning Center (GILC) in the Li Ka Shing Center for Learning and Knowledge (LKSC). The LKSC is a beautiful building and our new home on the Ground Floor is spacious and impressive. We have been working our way through a number of teething pains of the ILC's cutting edge technologies and physical plant. Despite some challenges we have been able to field an ever-growing set of ISL activities for the full spectrum of learner populations.

We continue to be grateful for the generosity of Mr. Li Ka Shing, the naming donor of the LKSC, and of Hon-Mai and Joseph Goodman, the primary donors for the ILC (Immersive Learning Center) floor for providing the opportunity to create this world-class integrated center where all modalities of immersive and simulation-based learning can exist in one spot.

As described last year, the previously existing simulation centers (Simulation Center at VA Palo Alto HCS; CAPE; Goodman Surgical Simulation Center) continue to thrive often with a more tailored focus on their unique activities and target populations.

Critical to CISL's missions are its people. Sandra Feaster has been promoted to Assistant Dean for Immersive and Simulation-based Learning; she is the Director of the ILC. We have two staff running the Standardized Patient (actor) facility (Karen Thompson Hall and Leslie Breton; with medical direction by Drew Nevins, M.D.). There are two "simulationists" – a job category and title more or less created by us at Stanford – (Teresa Roman-Micek and Joseph Phillips) and a Continuing Medical Education Simulation Specialist (Kim Yaeger). In the coming year we hope to fill the position of ILC Manager to oversee the operations of the ILC and be the first point of contact for faculty. These staff are supported by the AV/IT group of Educational Technology (largely Robert del Visco and Trent Tanaka).

Stanford faculty, clinicians, researchers, and staff continue to be innovators of ISL and to play major roles in the national and international adoption of ISL techniques and applications to improve quality and patient safety. Faculty also continues with externally funded research either about simulation or using simulation to study other issues in healthcare. An important process in the coming year will be the involvement of CISL faculty in the School of Medicine's four Working Groups considering curriculum reform for the medical student education process. At least one simulation expert faculty member is present on each of the four groups. Collectively they will work to see that the unique capabilities offered by all the modalities of simulation and immersive learning can be brought to bear where they can best enhance the learning of our medical students. Beyond Stanford, faculty and staff continue to work in the U.S. and elsewhere to help create organizational infrastructures to sustain continued development of ISL techniques, applications, and technologies.

Stanford continues to be recognized around the world as the pioneering site for many aspects of simulation and immersive learning and as a world leader. Our goal is, as ever, to improve the efficiency, quality, and safety of care for all patients, while simultaneously improving the education, training, and assessment of the caregivers. This is a noble goal and we are pleased to once again present an update on our progress as pioneers of this effort.



David M. Gaba, MD  
Associate Dean,  
Immersive and Simulation-based Learning



*Dr. David Gaba and  
Congresswoman  
Anna Eshoo.*

*This document is designed to highlight the new activities of the Center for Immersive and Simulation-based Learning (CISL) under the purview of the office of Associate Dean for ISL, for the time period of August 2010- September 2011. For the most part, previous activities continue and to a large extent have become regular components of teaching, learning, and research at Stanford School of Medicine and its affiliates.*

### **Strategic Goal 1: Education and Training of Students and Clinical Trainees**

Immersive and Simulation-based Learning (ISL) is used to improve the education and training of Stanford students (undergraduate, medical and graduate) and the Medical Center's trainees (residents, clinical fellows and postdoctoral scholars).

*"Practical practice with materials was great! Teaching about pathophys [sic] and treatment was fantastic. I have a much better understanding of the concepts we discussed."*  
—medical student

In August 2010, the Goodman Immersive Learning Center (ILC) in the Li Ka Shing Center for Learning and Knowledge (LKSC) opened its doors and embraced immersive and simulation-based learning in the new School of Medicine facility. Medical students, housestaff, and experienced clinicians throughout the Stanford community now have a center that houses mannequin-based simulation, standardized patient activities and task training skills in 28,000 contiguous square feet. Meanwhile, all the smaller simulation facilities in the Stanford family; Center for Advanced Pediatric and Perinatal Education (CAPE), Goodman Surgical Simulation Center (GSSC), the Simulation Center at VA Palo Alto Health Care System and the Cardiac Surgery Simulation Center in Falk Cardiovascular Research Building remain active, teaching various learner populations most relevant to their missions.

*Highlights of the various activities that are occurring throughout the Center for Immersive and Simulation-based Learning (CISL) consortium are listed below and throughout this document (PLEASE NOTE: This is not an exhaustive list of all activities).*



*Surgeon Sherry Wren, MD, and anesthesiologist David Gaba, MD and their associates use simulation to create a training video on ethics in clinical decision making.*

### **STANDARDIZED PATIENT PROGRAM (SPP)**

The SPP has been running its programs in the ILC for over one year as it was the first group to begin teaching in the ILC. A concerted effort was made to have the technology and infrastructure for these medical student activities in place upon the opening of the building. A variety of exercises are held in the 10 "mock clinic spaces" including: Ambulatory Medicine, OB/GYN, Practice of Medicine (POM) and the annual capstone Clinical Performance Examination (CPX), which was held in the ILC for the first time in July 2011.

The processes and workflows continue to be streamlined and improved, thanks to the work of the ILC core staff and their collaboration with faculty. Dr. Andrew Nevins, Medical Director for the SPP, continues to develop new exercises for students and provides consultation for faculty wishing to utilize standardized patient actors for new programs and activities.

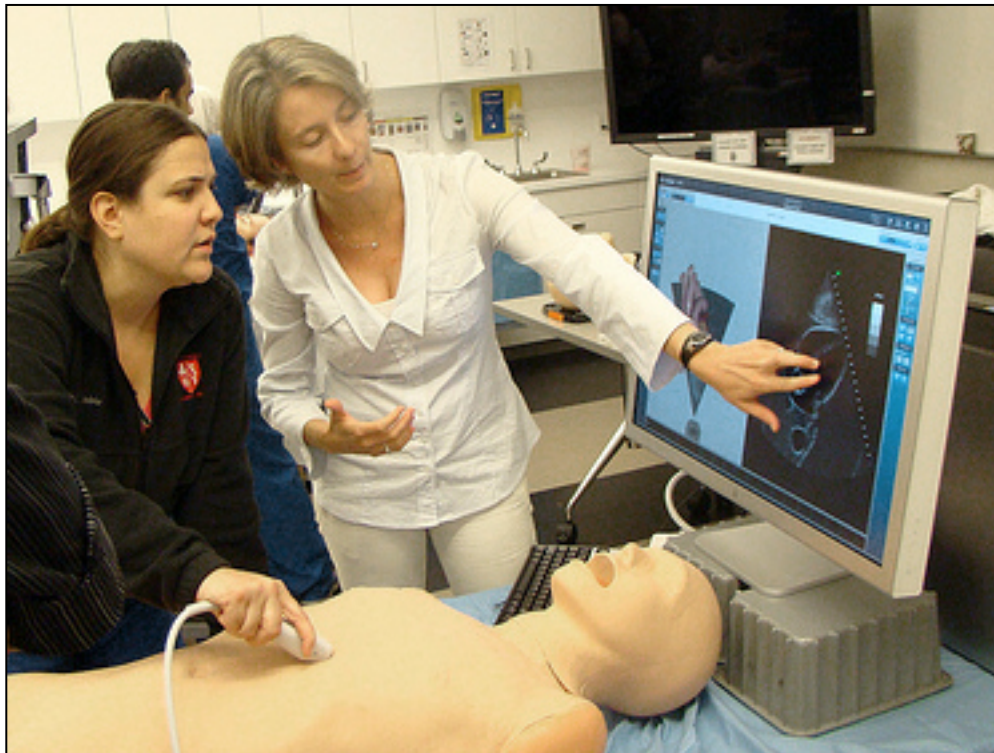
The SPP has provided patient actors for several activities outside the regular program of “medical student training and assessment.” These activities include central line insertion exercises (for locating vessels and identifying human anatomy – then using task trainers for the actual line insertion), delivering a bad news diagnosis (plastic surgery), and actors playing clinicians and family members during mannequin-based simulations. There is growing interest and use of standardized patient actors for training housestaff and for Continuing Medical Education (CME) activities.

### TASK TRAINING

More task training activities have been added to the student curriculum, giving students the opportunity to gain additional technical skills under the guidance of faculty mentors. Among the available trainers are those for ophthalmoscopy and otoscopy exams, cardiopulmonary physical examination, central line placement, lumbar puncture, intraosseous (I/O) placement, and various techniques of airway management and endotracheal intubation. Dr. Jeff Dunn, in the Department of Neurology, is conducting one new activity using the lumbar puncture and ophthalmology simulators to teach neurological assessment and skills to medical students (NENS 301A) and to neurology residents and fellows.

### DEPARTMENT SPECIFIC ACTIVITIES

More departments are realizing the impact that immersive learning can have and we have seen a growing number of new programs and applications. Highlights of these activities are listed below by department. Some courses have been in existence for some time, but are now in the ILC and have been “revamped and enhanced”.



*Anne-Sophie Beraud, MD (right) uses the echocardiography simulator to teach anesthesia resident Erin Hennessey, MD nuances of the technique.*

### ANESTHESIA

**STARS** - This session, designed for medical students is divided into two different sessions, adult and pediatric. In addition to mannequin simulation, the exercise also includes a “guess the drug” exercise. The software of the mannequin simulator is used to demonstrate physiological changes after a blinded drug administration. Drs. Lighthall and Harrison published a paper based on this technique for teaching students titled: *A Controllable Patient Monitor for Classroom Video Projectors*, in *Simulation in Healthcare*, Feb, 2010.

*“This was a great practice to remember teamwork and listening to each other as well as learning from each others knowledge and mistakes.”*  
–anesthesia resident

## EMERGENCY MEDICINE

**Pediatric and Adult Emergency Medicine Crisis Resource Management (EMCRM)** now run their exercises in the Immersive Learning Center. These two activities run simultaneously in the Center and have been the prototype for running two independent mannequin-based simulation courses during the same time period. The faculty has been flexible as the ILC staff work out the various workflow challenges and other technical logistics. It is expected that in the near future it will become common for the ILC to run multiple complex mannequin-based sessions at the same time.



*Faculty members Kyle Harrison, MD and Steve Howard, MD (back row) conducting a simulation in a post-anesthesia care unit setting.*

*"Liked the hands-on working with team--nurses, attendings and staff."  
-EM resident*

### Disaster Management

The Emergency Medicine faculty is actively working with the ILC staff to develop large-scale disaster scenarios, incorporating multiple mannequins and actors. These exercises are planned for early in 2012.

## MEDICINE AND CARDIOLOGY

### Physical Assessment

Abraham Verghese, MD and Anne-Sophie Beraud, MD have been active users of "the cardiovascular room" (Room LK013 in the ILC). This space houses the Harvey cardiopulmonary physical diagnosis simulator used for exercises for medical students with attending physicians, Educators for Care (E4C) faculty, and the Physician Assistant Program (PCAP).

There has been extensive use of our ultrasound simulator that supports transthoracic and transesophageal echocardiography (ultrasound of the heart) and the abnormal ultrasound of the abdomen in trauma settings (FAST exam). Dr. Anne-Sophie Beraud has been the primary teacher for echocardiography simulation, especially for residents and fellows from anesthesia and intensive care.

*Dr. Verghese demonstrates the finer points of cardiac physical examination using the Harvey the cardiopulmonary patient simulator.*



### Simulated Patient Rounds

Faculty members Jeff Chi, MD and John Kugler, MD, hospitalists in internal medicine, introduced weekly simulation bedside rounds for medical students during their medicine clerkship using a simulation mannequin in the acute care room of the ILC. These bedside rounds allow student and instructor to present and discuss a patient in a safe simulated environment.

### OBSTETRICS

The OB team has been performing a series of precipitous breech delivery with uterine inversion drills at CAPE. The team continues daily multidisciplinary rounds on the Labor Ward as a result of the in-situ debriefings. In-situ drills resumed in August 2011 at Lucile Packard Children's Hospital. This work yielded a recently published article titled: *Labor Room Setting Compared with the Operating Room for Simulated Perimortem Cesarean Delivery: A Randomized Controlled Trial*, in Obstetrics and Gynecology, Nov 2011.

### SURGERY

The Goodman Surgical Simulation Center (GSSC) offers several novel programs for medical students. Among them is the GSSC's new skills curriculum for students in their 3rd year core surgery clerkship, designed and implemented by surgical education fellows, Drs. Dana Yip and Aarthi Kannappan. Each week, the students are taught several essential procedural skills through lectures, task trainers, and simulators. Faculty members James Lau, MD and Sakti Srivastava, MD offer a boot camp skills course at the end of the school year for those medical students who matched in procedural-based specialties to better prepare them for their upcoming internship year.



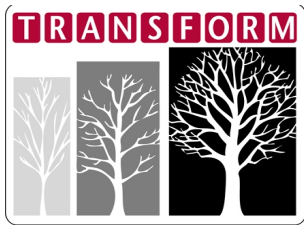
*Pediatric anesthesia faculty member Calvin Kuan, MD teaches with a child simulation mannequin.*

*"Liked the interactive real-time case solving."  
—medical student, SURG 313*

### Strategic Goal 2: Healthcare Systems Improvement

To improve care delivery and operational outcomes of Stanford Hospital and Clinics, Lucile Packard Children's Hospital, (also in conjunction with the SHC/LPCH Insurance Company (SUMIT)), and VA Palo Alto, by improving the individual and teamwork skills of healthcare personnel.





Project TRANSFORM, a funded research study by the Gordon and Betty Moore Foundation, was designed to evaluate the effects of a simulation-driven, patient safety program on clinical outcomes at Stanford Hospital & Clinics (SHC). The one-year study was a collaborative effort between physicians and nurses at SHC, unit-based medical directors and Nancy Szarflarski, MD and Lynn Forsey, MD from Quality Management (QM). Associate Dean Clarence Braddock, MD was the principal investigator, and was aided by CISL faculty David Gaba, MD and Geoffrey Lighthall, MD, PhD.

Clinical nurse specialists and unit-based medical directors from four medical-surgical hospital units underwent formal simulation instructor training by Dr. Gaba and the CISL team. Guided by project manager, Lynn Abel, RN, MSN, the unit-based teams were responsible for conducting four simulation exercises and debriefings per month per unit, on both day and night shifts. From July 2010 to June 2011, in situ simulation training reached over 90% of registered nurses and 92% of house staff who practiced on the study units. These simulation exercises focused on improving early detection and treatment of selected hospital complications. Debriefings emphasized the importance of evidence-based care for sepsis and acute respiratory complications. Debriefings also focused on how to integrate principles of crisis resource management into everyday practice to improve interdisciplinary teamwork.



Preliminary results of 6-month intervention data have shown significant decreases in the aggregate rate of hospital-acquired severe sepsis and septic shock and acute respiratory failure, as well as aggregate risk-adjusted hospital mortality. The one-year intervention study concluded in June 2011 and a sustainability plan is in place.

### ICU SIMULATION

Under the direction of faculty member Paul Mohabir, MD, (SHC Intensivist), monthly code team training for the ICU staff began in late summer 2011. These 2-hour sessions bring together trainee physicians at all levels of experience (medical students to fellows), nurses, respiratory therapists, and pharmacists to assess their ability to run a successful resuscitation. These sessions are held in ILC's Acute Care Suite (rooms configured to look and feel like the ICU spaces). Occasionally an extra patient is added to replicate the chaos that often occurs during a code.

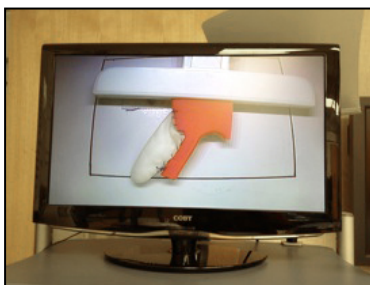
### OBSTETRICS

The OB team at LPCH created a *Drills Advisory Committee* under the guidance of faculty member Kay Daniels, MD, who continues to serve as Chair of the Labor & Delivery Safety Committee at LPCH. Their goal is to prioritize and then address systems issues on the Labor Ward identified by the participants during the drills' debriefings. This further reinforces how multidisciplinary in-situ simulation can be used for system probing and system redesign in a clinically relevant fashion.

### Strategic Goal 3: Simulation for Performance Assessment

To use Immersive and Simulation-based Learning techniques for explicit assessment/testing of skills, knowledge, and performance of students, trainees, and experienced personnel.

### SURGERY



The GSSC team developed several innovative modules for general surgery residents with the use of various types of simulation, partial task trainers, animal tissues, and cadavers to enhance and assess their knowledge and skills. Examples include use of the finger of a surgical glove stuffed with cotton and sewn to the side of a Fundamentals of Laparoscopic (FLS) foam appendage to create simulated appendix for an appendectomy module and vascular grafts sewn with beads inside to emulate the common bile duct (CBD) for the CBD exploration module (shown left).

### MULTI-MINI INTERVIEW (MMI)

The ILC has been the site where applicants to the School of Medicine, chosen on the evidence of academic accomplishments, relevant life experiences and personal qualities are invited to participate in the School of Medicine's multiple mini-interview. MMI involves a variety of short "encounters" between the applicant and different interviewers/raters. Each encounter includes a key question, task, or scenario for applicants to engage in. In essence, each MMI encounter is a mini-simulation.

The MMI process, which is now entering its second year at Stanford, originated at McMaster University Medical School in Ontario, Canada. Read more about MMI at Stanford: <http://med.stanford.edu/ism/2011/january/interview-0110.html>.

*"At this stage, all of our candidates are academically ready for medical school. What we want to measure are the more personal traits that aren't so easy to measure: compassion, ethics, critical thinking, interpersonal skills."*  
*–Gabriel Garcia, MD, Associate Dean for MD Admissions*

**Strategic Goal 4: Research**

To promote, support and conduct fundamental research and evaluation about ISL and to use the ISL techniques as a research tool.

**CISL AND EDUCATIONAL TECHNOLOGY MINI-GRANTS**

This past year's Mini-Grant awardees had a diverse and wide reach of activities. The grants demonstrated the diversity of interest and expertise at Stanford School of Medicine. In 2011, 27 applications were received of which 8 awards were funded.

**Funded Mini-Grant Awards for the 2011-2012 Year**

Mini-Grant Project Title	Faculty	Target Audience
Plastic Surgery Headcam	Aaron Berger, Sina Bari, Gordon Lee	Residents
Mobile Interface for Managing Advanced Cardiac Life Support	Larry Chu, Sara Goldhaber-Fiebert, Kyle Harrison	Varied
Web-Based Multi-Media Module as Educational Tool for Housestaff Anesthesia	Ludwig Lin	Residents
Stanford 25 Pocket App for Physical Exam	John Kugler, Jeffrey Chi, Brooke Cotter, Abraham Verghese	Medical Students
Genetics Counseling Course Videos to Mobile	Kelly Ormond	Graduate Students
Evaluating ACGME Core Competencies in Plastic Surgery Residency with OSCES	Gordon Lee, Kamakshi Zeidler	Residents
Development of a Digital Anatomy Lab Manual	Sakti Srivastava	Medical Students
Using Simulation in Disaster Preparedness	Jessica Ngo	Varied

**HIGHLIGHTS FROM SEVERAL OF THE COMPLETED 2010-2011 MINI-GRANT PROJECTS:**

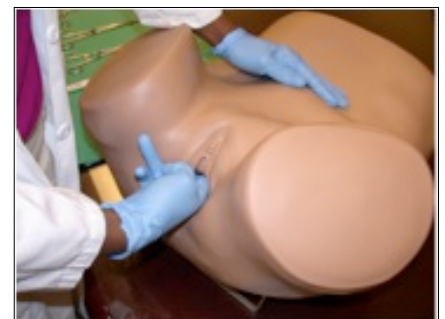
**1. Enhanced Use and Availability of Task Trainers for Invasive Procedure Training in the ICU**  
 Geoffrey Lighthall, MD, PhD

This project sought to establish new standards for physician preparation prior to placement of central venous catheters. An iPad and a vascular access torso trainer were installed in the ICU area to provide 24/7 videos and training models "on demand" for both initial and reinforcement training of line placement. All interns documented use of the video and of the trainer on a white board in the ICU to track these training pre-requisites prior to performing procedures on patients.

**2. Using Model Simulation to Decrease Learner Anxiety in the Examination of the Genital/Urinary System**  
 Lars Osterberg, MD, MPH, Nounou Taleghani MD, PhD, Bertha Chen, MD

After completion of this simulation:

- Students felt more confident in performing the examinations
- Students felt more comfortable in explaining the steps of the exam to the patients
- and in the skills of these examinations
- Students felt they had more knowledge about the steps in these examinations
- Students felt more prepared in using the equipment for pelvic examinations
- Students felt more confident in the anatomy
- Most important, the *Project Prepare Pelvic Models* (female actors who teach students pelvic examinations on themselves) reported that students were more proficient and comfortable doing the pelvic exam after their experience with practicing on the plastic pelvic training devices compared to students who previously had not experienced practicing with the plastic pelvic training devices in prior years.



*Student performing exam on pelvic trainer.*



### 3. Procedural Skill Training for Direct Ophthalmoscopy Assessment

Douglas Frederick, MD

The Effect of Simulation Technology on Medical Student Proficiency Performing Direct Ophthalmoscopy

Vibhu Mahendra, BA, Douglas R. Fredrick, MD  
Stanford University School of Medicine, Byers Eye Institute at Stanford

**Abstract**  
Purpose: Given the decline in time allocated for ophthalmic education in medical school, the efficacy of simulation technology as a supplement to the traditional curriculum should be evaluated. Methods: We hypothesized that practice with simulation would improve student proficiency at the fundoscopic exam and randomized the first year medical class (n=142) into control and intervention groups. Results: An objective proficiency score for the simulation intervention group was 0.715 compared to the control group = 0.66 (p<0.05). Conclusions: Results suggest that the simulation model is a useful adjunct to the traditional model of educating medical students in direct ophthalmoscopy.

**Background & Hypothesis**  
Due to a greater emphasis on core medical curriculum, specialty education, especially ophthalmic education, is no longer emphasized in the majority of medical schools in the US. Consequently, medical students have limited knowledge of ocular anatomy, basic eye examination skills, common reasons for vision loss, and important relationships between the eyes and systemic disease.  
Hypothesis: In the RCT setting it was hypothesized that students who trained on the simulation models would demonstrate higher proficiency, technique, and confidence performing the fundoscopic exam when compared to those who trained on human subjects.

**Methods & Materials**  
The first year medical class (n=86) was randomized into control and intervention groups, with and without the simulation model.  
Study design: 3-armed randomized control trial.  
All students received the traditional lecture-based training on common ocular pathology and use of the direct ophthalmoscope. Following the traditional lecture/practice session, the students were randomized into three groups:  
1. Control group: traditional lecture/practice session only.  
2. Simulation group: traditional lecture/practice session followed by simulation practice.  
3. Human subject group: traditional lecture/practice session followed by human subject practice.

**Results**  
Objective Evaluation: An objective proficiency score for the simulation intervention group was 0.715 compared to the control group, 0.66 (p=0.05).

**Outcome Measures**  
Objective Skills: Knowledge, Student confidence, Identification of structures, Interpretation of findings.  
Subjective Skills: Self-perceived proficiency.

**Subjective Evaluation**  
The best thing about my training session was...  
"Practicing on the dummy was a lot less stressful than practicing for the first time on a real patient."  
"I appreciated being able to view different pathologies during my training session with the dummy."  
"Working with the model allowed me to take extra time adjusting the ophthalmoscope. I would worry about this with real people as I know the exam can be uncomfortable."

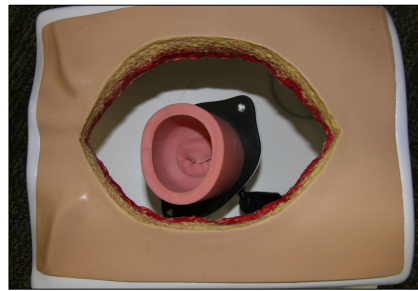
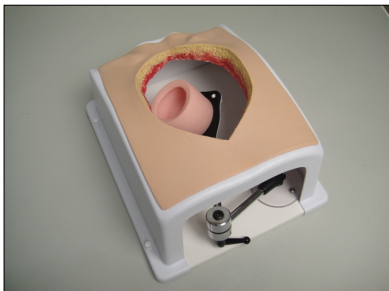
**Conclusions**  
The absolute improvement in performance between control and intervention groups suggests that the simulation model is a beneficial adjunct to the traditional model of educating medical students in direct ophthalmoscopy by practicing on one another. The subjective outcomes also indicate that students appreciate the opportunity to learn the difficult skill in the low stress and standardized environment provided by simulation technology. We recommend that students be initially trained on this simulation model with the opportunity to have repeat practice sessions with both real patients and simulation.

**References**  
Medical student education in ophthalmology: crisis and opportunity. Quillen DA, Harper RA, Haik BG. Ophthalmology 2005 Nov;113(11)

The results of this project lead to a poster presentation at the American Academy of Ophthalmology Annual Meeting, October 23, 2011.

### 4. Simulation in Cardiac Valve Surgery and Crisis Management in Residency Training

James Fann, MD



Cardiac Valve Model

Results: For the mitral valve surgery simulation, time to completion improved from a mean of 31 ±9 min to 25 ±6 min after the 3-week period (p=0.03). At 3 weeks, improvement in the technical components was achieved in all residents, with the pre-feedback scores varying from 2.4 ±0.6 for needle angles to 3.0 ±0.5 for depth of bites and post-feedback scores of 3.1 ±0.8 for tissue handling to 3.6 ±0.8 for suture management/tension at 3 weeks (p≤0.001). In this small sample, the composite scores of first-year integrated and traditional residents were lower than those of senior level residents; the third-year integrated residents demonstrated good technical proficiency compared to the first-year traditional residents. We concluded that simulation-based learning employing formative feedback results in overall improved performance in a simulated mitral valve annuloplasty model. In complex surgical procedures, simulated-based learning may provide necessary early graduated training and a means for practice with formative feedback. An important implication is that a "passing" grade can be established for proficiency-based advancement. Regarding the development of crisis management using cardiopulmonary bypass, resident assessment demonstrated major and minor deficiencies using performance checklists. We demonstrated value in using such training during residency, but further scenario development and assessment are necessary.

#### VASCULAR SURGERY RESEARCH

Dr. Lee is continuing his RWJF grant-funded study to determine if a simulation-based endovascular surgery curriculum will improve trainee performance (measured by technical skill, didactic knowledge, and learner satisfaction). Additional trainees have been added to the study and are progressing towards the completion of the project. Research coordinator, Emily Lilo transitioned out of the project and Amy Peruzzaro is the new research coordinator.

#### AHRQ FUNDED STUDY

Associate Dean David Gaba is one of three co-investigators on a 12 site (Stanford plus 11 others) AHRQ Funded project: *Creating simulation-based performance assessment tools for practicing physicians (1 R18 HS020415-01)*. The project Principal Investigator is Matt Weinger, MD at Vanderbilt University (who also has strong connections with Stanford). This three-year study grafts performance assessment measurement onto the already existing Maintenance of Certification in Anesthesia (MOCA) Simulation Course. The project will develop techniques of scenario standardization, training of raters, and rating of the medical/technical and behavioral performance of Board-Certified anesthesiologists. The results will inform the possible future development of simulation-based high-stakes examinations of anesthesia and other dynamic domains of healthcare. The project began in Spring 2011; enrollment of subjects is expected to begin in mid-2012.

## **Strategic Goal 5: Provide ISL Learning to External Learners**

**Through Immersive and Simulation-based Learning, improve the clinical skills (both “technical” and “non-technical”) of healthcare personnel as individuals and teams.**

The Li Ka Shing Center for Learning and Knowledge played host to a variety of simulation and immersive learning Continuing Medical Education (CME) activities. The focus of Immersive and Simulation-based CME courses is twofold: the first pertaining to the pedagogy of simulation and the second to improving the cognitive, technical and behavioral clinical skill sets of physicians and experienced learners. Additional CME courses are offered in the ILC and other simulation facilities at Stanford. CISL has played a key role in developing and/or facilitating these courses. The CISL CME activities are described below:

### **CRM INSTRUCTOR COURSE**

CISL offers a comprehensive 2.5-day Crisis Resource Management (CRM) Simulation Instructor Course. This course offers intensive training in the methodology of simulation including scenario development, curriculum integration, the art of debriefing and hands-on experience running scenarios on the fly. Participants are able to create and refine a scenario, run the scenarios for their colleagues and debrief – all under the guidance and supervision of experts in the field.

### **CRM DEBRIEFING COURSE**

CISL also offers a one day intensive CRM Debriefing Course. This course is designed for healthcare professionals and educators with novice to intermediate levels of debriefing experience. The course is hands-on with a variety of role playing activities, small group exercises, group discussion and video review. This course was piloted internally. Our goal is to provide faculty and staff with skills that are applicable to both the simulation education setting and real clinical environment.

### **MAINTENANCE OF CERTIFICATION IN ANESTHESIA (MOCA)**

CISL launched Stanford’s first ever Maintenance of Certification CME course this year. Stanford is an American Society of Anesthesiologists Endorsed Simulation Center and as such, the Stanford Maintenance of Certification in Anesthesiology (MOCA) Simulation Course was launched in December 2010. This course combines cognitive, technical and behavioral skills that are critical for anesthesiologists to effectively diagnose and manage a variety of challenging patient care scenarios. Given the positive reception with which this course has been met and the current demand for more courses, we will be offering the Stanford MOCA Course 4-6 times each year. With current scenarios focused on the adult patient, a small cohort of pediatric anesthesia faculty is actively involved in creating scenarios involving babies or children in order to meet the needs of the pediatric anesthesia providers enrolled in the MOCA process.

### **SINGLE INCISION LAPAROSCOPIC SURGERY (SILS) AND ADVANCED EVAR COURSE**

The popular courses offered to the practicing surgeons and physicians included the Single Incision Laparoscopic Surgery (SILS) course and the Advanced EVAR course. These courses are held in the Goodman Surgical Simulation Center. In addition, the GSSC partnered with the faculty in the Business School to conduct leadership CME courses for practicing clinicians. These leadership courses concentrated on communication, conflict resolution and situational leadership during critical patient care.

### **STANFORD OFFICE OF CME PFIZER GRANT PROJECTS: 2011**

Annually the Office of CME uses funds from the Pfizer Grant to support new projects for CME on a competitive basis. In 2011 the successful proposals included many that use simulation as a central part of the education program and several others for which simulation is an important enabling modality to prepare enduring materials for other forms of teaching. Below are funded CME activities that have a touchpoint with immersive and simulation-based learning and the CISL.

<b>Primary Investigator</b>	<b>Department</b>	<b>Project Title (abbreviated)</b>
Verghese, Abraham	Medicine	Stanford 25 CME Project
Chona, Sangeeta	Emergency Medicine – Peds	APLS – SIM
Wang, Paul	Medicine – Cardiology	Sim in Catheter Ablation
Chu, Larry	Anesthesia	iPad Application for Teaching CRM – ACLS
Lau, James	Surgery	Single Site Laparoscopy
Williams, Sarah	Emergency Medicine	Point of Care Ultrasound (Note: Simulation used to prepare teaching materials, e.g. videos)
Lin, Ludwig	Anesthesia	Regional Anesthesia Workshop
Shieh, Lisa	Medicine	Team Sepsis (a mobile game)

## **SIMULATION IN MEDICAL EDUCATION (SIME) SEMINAR SERIES**

In the fall of 2011, CISL reinvigorated the Simulation in Medical Education (SiME) Seminar Series. This series, begun by Dr. LeRoy Heinrichs, Professor Emeritus, over a decade ago has hosted nationally and internationally recognized speakers. This series encompasses a variety of simulation topics including reporting on new programs and technologies, international simulation and how-to workshops. This series creates a forum for current and new simulation enthusiasts to experience and gain awareness of new techniques and technologies in immersive and simulation-based learning.



*Dr. Bernard Harris, CISL Symposium keynote speaker at his book signing.*

## **5<sup>TH</sup> CISL ANNUAL SYMPOSIUM (NON-CME ACTIVITY)**

This symposium is a popular activity that highlights the various activities of Stanford Faculty in the realm of immersive and simulation-based learning. This year, we were fortunate to feature as our keynote speaker, Dr. Bernard Harris, physician, astronaut and entrepreneur. Dr. Harris provided an insight into the world of simulation through the eyes of an astronaut. What it takes to have the “right stuff” and how important simulation is to flight safety. We were also pleased to welcome the Stanford Alumni Association who assisted with logistics for the CISL symposium. One of the highlights of this symposium, in addition to our inspirational keynote speaker is always the “rapid-fire” five-minute updates on the wide diversity of simulation activities being conducted throughout the Stanford School of Medicine and affiliated hospitals. Collaborations are often made at these sessions, enhancing the synergies for immersive and simulation-based learning.

Information about CISL programs (CME and Non-CME) can be found at <http://cisl.stanford.edu>

## **Strategic Goal 6: Community Outreach**

**To develop and conduct outreach programs for local community and lay groups, as well as public safety and public health organizations, and healthcare providers, exposing them to the benefits and potential of Immersive and Simulation-based Learning.**

CISL continues to reach out and welcome the local community, healthcare providers and our own School of Medicine colleagues. The CISL consortium members hosted visitors from all over the world this past year. In addition, local schools and programs visit the centers regularly (with the summer being a particularly active time for high school and college students interested in medicine).

The consortium also hosts leaders in the community either through the Packard 101 Program or the SHC Community Fellows Program. These programs invite community leaders (business men and women, policy makers, legislators, etc.) to visit the hospitals, various departments and experience simulation learning at the various centers. Below are a few examples of CISL consortium outreach activities:

### **HOSPITAL BASED OUTREACH PROGRAMS**

SHC Community Fellows Program  
Packard 101

### **HIGHLIGHTED ACTIVITIES FOR YOUTH**

Judith Ned, PhD runs the summer Stanford Medical Youth Science Program (SMYSP), a 2-day summer medical program, held in early August 2011 at the ILC and the GSSC, that provides local high school students the opportunity to:

*Experience immersive hands-on medicine*

- Participate in state-of-the-art anatomy and surgery simulations
- Take part in lab demonstrations
- Participate in discussions about current medical topics

*Create a competitive portfolio for a career in health or science*

- Write outstanding college and medical school essays
- Be successful in college and medical school interviews
- Identify and leverage volunteer experiences

### **COMMUNITY ACTIVITIES**

The California EMS Academy in Foster City regularly holds simulation exercises at the GSSC.

### **INTERNATIONAL ACTIVITIES**

(1) OB Sim experience for a team from the Shanghai University School of Medicine, Department of Obstetrics.

(2) Simulation experience for a team of medical students from different medical schools in Japan.

(3) The PIXEL Study Tour, Over 25 students from the University of Twente, Netherlands visited various Stanford departments with a goal of researching the games and simulation industry.

(4) Associate Dean, David Gaba, MD was one of three keynote speakers at the 2011 Annual Meeting of the Society in Europe for Simulation Applied to Medicine (SESAM) in Granada, Spain.

### **CISL WEBSITE**

The CISL website, <http://cisl.stanford.edu>, continues to be the hub of information for simulation and immersive learning activities in the Stanford School of Medicine. It is a wealth of information for both internal and external viewers. In FY10 the website had over 11,500 visits from 131 countries.

### **Strategic Goal 7: Leadership and Advocacy**

**To provide leadership in advocating the future vision of immersive and simulation-based learning in health care for the nation and the world.**

The Department of Surgery continues to meet the requirements necessary for accreditation by the *American College of Surgeons Education Institute (ACSEI)*.

The Department of Anesthesia is an *ASA Endorsed Simulation Program* and is able to offer the Maintenance of Certification for Anesthesiologists simulation course (MOCA).

Faculty obstetrician Kay Daniels, MD and the OB Sim team have been designated as the *West Coast Simulation Center for American College of OB and GYN (ACOG)*.

Dr. Gaba continues his role as founding and current Editor-in Chief of the only indexed, peer-reviewed journal in simulation – *Simulation in Healthcare* (circulation of >2600 readers worldwide). In 2011 the Journal received its first impact factor of 2.036, ranking favorably compared to other journals in the healthcare quality and education arena, and a remarkable achievement for a new journal in only its 6<sup>th</sup> year of publication.

CISL continues its leadership role nationally and internationally. With the opening of the LKSC, the ILC faculty and staff have hosted many individuals and groups from around the world interested in building new simulation facilities, teaching immersive learning, and understanding the technology used in simulation.

CISL is a founding and current member of Advanced Initiatives in Medical Simulation (AIMS), and CISL remains active in legislative advocacy, with Stanford representatives returning to Washington, DC annually to meet with legislators and their staff to educate them about simulation as well as hosting legislators and their staff at Stanford.

## Goal 8: Faculty Development

To recruit, train and sustain faculty to become effective Immersive and Simulation-based Learning educators.

(THESE LISTS ARE NOT EXHAUSTIVE OF THE CISL)

### PUBLICATIONS

- Aparajita R, Casey K, Dayal R, Lilo E, Lee JT. Development of an introductory endovascular training curriculum for medical student education: a multicentre study. In press, *Ann Vasc Surg*.
- Fann JI, Feins RH, Hicks GL, Jr., Nesbitt J, Hammon J, Crawford F, and members of the Senior Tour in Cardiothoracic Surgery. Preliminary evaluation of simulation training in cardiothoracic surgery. (Submitted).
- Feaster, S,J, Gaba, D.M. Anesthesia and Simulation. In Textbook of Simulation (in Press) Cine-Med, Inc.
- Gaba, D.M., Feaster, S.J., Mannequin-based Simulation in Healthcare. In Simulation Update: A Review of Simulation-based Strategies for Healthcare Education and Training. Orlando: Department of Veterans Affairs SimLEARN, June 2010.
- Gaba DM: Crisis resource management and teamwork training in anaesthesia (editorial). *Br J Anesth*; 2010; 105:3-6.
- Gaba DM: Head to Head: Have we gone too far in translating ideas from aviation to patient safety – No. 2011; *BMJ*; 342:c7310.
- Gaba DM: Training and nontechnical skills: the politics of terminology (editorial). *Simul Healthc*. 2011; 6:8-10.
- Gaba DM: Where do we come from? What are we? Where are we going? (editorial). *Simul Healthc*. 2011; 6:195-196.
- Gaba DM: Adapting space science methods for describing and planning research in simulation in healthcare: science traceability and Decadal Surveys. *Simul Healthc* (In press).
- Hicks GL, Jr., Gangemi J, Angona RD, Jr., Ramphal PS, Feins RH, Fann JI. Cardiopulmonary bypass simulation and assessment at the Boot Camp. *J Thorac Cardiovasc Surg* 2011; 141: 284-292.
- Joyce DL, Dhillon TS, Caffarelli AD, Joyce DD, Tsirigotis DN, Burdon TA, Fann JI. Simulation and skills training in mitral valve surgery. *J Thorac Cardiovasc Surg* 2011; 141: 107-112.
- Kardong-Edgren S, Gaba D, Dieckmann P, Cook DA: Reporting inquiry in simulation. *Simul Healthc* 6: Suppl S63-S66.
- Lee JT, Son JH, Chandra V, Tedesco MM, Lilo EA, Dalman RL. Long-term impact of a preclinical endovascular skills course on medical student career choices. In press, *J Vasc Surg*.
- Leeper N, Lee JT, Cooke JM. Two decades of progress in vascular medicine. In press, *Am J Med*. 2011 Jun 16 [Epub ahead of print].
- Lipman S, Daniels K, Arafeh J, Halamek L, "The Case for OBLS: A Simulation-based Obstetric Life Support Program," *Semin Perinatol* 2011; 35:74-79.
- Mudumbai SC, Fanning R, Howard SK, Davies MF, Gaba DM: Use of medical simulation to explore equipment failures and human-machine interactions in anesthesia machine pipeline supply crossover. *Anesth Analg*; 2010; 110:1292-1296.
- Nevins, A. and Gesundheit, N. The use of patient simulation in medical training: from medical school to clinical practice. Principles and Practice of Hospital Medicine (McKean, S., editor) 2011; McGraw-Hill, Columbus, OH, chapter 41.
- Plerhoples T, Zak Y, Hernandez-Boussard T, Lau J. Another Use of the Mobile Device; Warm-up for Laparoscopic Surgery. *J Surg Res*. 2011 Mar 31 [Epub ahead of print].

### PRESENTATIONS

- Feaster, SJ, Reihnsen, T. Data Management and Reporting of Simulation Center Activities, Presented at the 4th Annual Meeting of the Consortium of ACS-Accredited Education Institutes, March, 2011.
- Feaster, SJ, Reihnsen, T, Lutz, J., Schatzer, J. Common Definitions for Data Management and Reporting of Simulation Center Activities, Presented at the International Meeting on Simulation in Healthcare, January, 2011.
- Feaster, SJ, Burden, A, et al. Legislative Advocacy in the Unites States and Beyond (Why do it, How to do it, What we've learned), Podium Presentation at International Meeting on Simulation in Healthcare, January, 2011.
- Feaster, S, Brutlag, P. The Challenges of Opening a Major Immersive Learning Center, Immersive Education Initiative, Boston College, May, 2011.
- Gaba, D, "The Future of Research in Simulation: Thinking Strategically" at the annual meeting of the Society in Europe for Simulation Applied to Medicine (SESAM). Granada, Spain, June 2-4, 2011.
- Lee JT. How to teach new technologies to physicians to get the quickest and safest transfer to clinical practice? The state of the art on educational programs. Presented at the 7<sup>th</sup> European Symposium of Vascular Biomaterials. Strasbourg, France, May, 2011.
- Lipman, S. Systems Redesign and the Multidisciplinary Obstetric Crisis Drills: The OBSim Experience, Anesthesia Grand Rounds, Nov, 2010.
- Lipman, S. SOAP Sol Shnider Conference: "Labor & Delivery Ward Drills," San Francisco, California, March, 2011
- Son JH, Zayed MA, Tedesco MM, Chandra V, Lilo EA, Lee JT. Long-term impact of a preclinical endovascular skills course on medical student career choices. Presented at the 25<sup>th</sup> Annual Meeting of the Western Vascular Society, Sun River, OR, September, 2010.
- Zak Y, Plerhoples T, Lee JT, Visser B. A novel approach to the resident skills curriculum: Modules on rare and common procedures linked together with simulators created by the learner. Presented at the 4th Annual Meeting of the ACS-Accredited Education Institutes, Chicago, IL, March, 2011.
- Zayed MA, Casey K, Lilo E, Dalman RL, Lee JT. Interactive online training improves trainee test performance in vascular surgery. Presented at the Vascular Annual Meeting, Chicago, IL, June, 2011.

## AWARDS

### David Gaba, MD

- The Society for Technology in Anesthesia, J.S. Gravenstein Award for Lifetime Achievement, January, 2011
- Department of Veterans Affairs, Under Secretary for Health Award for Excellence in Clinical Simulation Training, Education and Research, January, 2011 (inaugural award)

### Steve Lipman, MD

- April 16, 2011: One of top 6 submissions out of >300 submitted and invited to compete in SOAP 2011 Best Paper Competition (*A Randomized Trial Comparing the Labor Room vs. Operating Room for Perimortem Cesarean Delivery During Simulated Cardiac Arrest*) - Honorable mention

### **Strategic Goal 9: Sustainability of Finances of Simulation**

**To provide financial and program planning and analysis of ISL programs and, to support the Office of Medical Development fundraising and ensure long-term financial viability of ISL activities.**

The Immersive Learning Center is available for activities for students and housestaff currently without a facility fee. The Center's staff provides technical expertise as well as pedagogical planning assistance. Various departments, including medicine, surgery and anesthesia have invested together (often with CISL) to acquire simulators for teaching various learner populations. This pooling of funds has made it financially feasible to acquire costly technology and reach a larger group of learners. Medical education is a high priority at the Stanford School of Medicine and the Dean's Office has made it possible to make the resources of the ILC and its core operating staff available to the faculty to allow them to innovate, develop, and provide state-of-the-art immersive education to the School's many learner populations. CISL is an active partner with the Office of Medical Development and frequently hosts tours and visits for those interested in the current and future of medical education.

### **Strategic Goal 10: Management**

**To create management infrastructure and procedures that effectively coordinate and integrate the Center's priorities, activities and resources among its constituent units and within the School and University.**

The CISL reporting structure in the School of Medicine moved from Information Resources Technology (IRT), under Sr. Associate Dean, Henry Lowe, MD to Education Programs and Services (EPS), under Sr. Associate Dean, Charles Prober, MD. This aligns CISL with the full scope of EPS, addressing all learner populations of the School. Sandra Feaster was promoted to be the Assistant Dean of Immersive and Simulation-based Learning with a continued reporting relationship to Associate Dean, David Gaba, MD for Immersive and Simulation-based Learning.

Beginning with the 2011-2012 academic year, the Simulation Team and Standardized Patient Program became one unified Immersive Learning Center staff. With improved workflows and synergy between the two groups, it is expected that the ILC will be the leader in efficiency and coordination in simulation.

David M. Gaba, MD  
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Deployed and New Curricula Using Immersive and Simulation-based Learning by Target Population (as of October 2011)							
Pre-Clerkship Med Students	Clerkship Med Students		Interns / Residents/ Fellows		Combined Team (Housestaff, Attendings, RNs, Allied Health)	CME or Equivalent	Nursing, Graduate Students, Allied Health
<b>ONGOING COURSES</b>							
INDE 201 - 206 POM (SPP)	OBGYN 300A (SPP)	Med 313 Ambulatory Med (SPP)	ACRM I, II, III (Sim)	Perinatal Counseling (SPP)	IMPES ICU Combined Team CRM Simulations (Sim)	NeoSim, PediSim, OBSim (Sim)	Sedation for Pediatrics (Sim)
CPX Series (SPP)	PEDS 300A - Pediatrics (SPP)	INDES 301A Fam Med (SPP)	Pedi Sim I, II, III (Sim)	Compass. Deliv. of Bad News (SPP)	SimDR Perinatal Combined Team Training (Sim)	Simulation Instructor Training (Sim)	Defibrillator and CPR training for nurses (Skills)
SURG 254 Operative analysis and techniques (Skills)	ANEST 306A Adult Crit Care Sims (Sim)	Deliv of Bad News for Gen Ped Clkshp (SPP)	NeoSim I, II & III (Sim)	Adult EMCRM I, II, III (Sim)	Disclosure of Unanticipated consequences (Sim)	Pedi ERSim (Sim)	Primary Certification in PALS (Sim/Skills)
Procedures Course - POM Q5 (Skills)	ANEST 306P Peds Crit Care Sims (Sim)	SURG 313A Emergency Med (Sim/Skills)	Pedi ER Sim I, II, III (Sim)	Peds EMCRM I, II, III (Sim)	Project Transform (in situ Sim)	Sim DR - Perinatal Team Training (Sim)	Versant Nursing Program at LPCH (Sim)
Intro to Mgmt of III Pt (Sim) POM Q6	SURG 228 & 229 Vascular Dis and Rx (Sim/Skills)	SURG 300A - Surgical Trauma (Sim)	Cardiac Surg fellows CRM (Sim)	SCARED Surgery (Sim)	Pedi Anesth Sims (in situ Sim)	ATLS/ACLS (Sim/Skills)	LifeFlight Skills and Simulation (Sim/Skills)
SURG 205 (Skills)			OBSim I; SimDR I (Sim)	SCARED Int Med (Sim)	Labor & Delivery (in situ Sim) Drills	Maint of Cert for Anesth (Sims)	GENE 286A Genetics Counseling MS Program (SPP)
			Int Med Invasive procedures (Skills)	SOS Int Med (Sim)	OB - BLS (Sim)	Simulation Debriefing (Sim)	PCAP Physician Assistant Program (SPP/Skills)
			ECMO Sim (Sim)	Surgical Core Curriculum			
			Surgery Intern Boot Camp (Skills)	OB/GYN Lap Surgery Training (Skills)			
<b>NEW COURSES</b>							
	MED 300A Bedside rounds (Sim)		Anesthesia "EVOLVE" course (Sim/SP/ Skills)	Bedside ECHO - TEE/TTE/FA ST (Skills)	ICU Mock Codes (Sim/ Skills)	Adv Ped Life Support (Sims)	
	NENS 301A (Skills)		Surgical Leadership and Comm (R1,3,5)	Difficult Airway (Skills)		Regional Anesthesia (Skills)	



CENTER FOR  
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LEARNING

STANFORD SCHOOL OF MEDICINE

## CISL Mission

To improve patient safety, patient care, education, and research through innovations in immersive and simulation-based learning techniques and tools through imbedding them throughout Stanford Medical Center's education and training programs.



**STANFORD**  
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**NOTE:** *Provided in this document are highlights of ISL activities throughout the Stanford community for the year 2010 and 2011. The focus is to highlight **NEW** Programs and Activities that occurred. The extent of activities of the CISL faculty and staff are continually expanding; thus this summary may not be inclusive of all activities.*